

Claims

1. An idle rotational speed controller of an internal combustion engine including an intake path for sucking air to be supplied to a combustion chamber of the internal combustion engine, a throttle valve arranged at the intake path for controlling an intake amount, an auxiliary intake path for communicating the intake path on an upstream side of the throttle valve and the intake path on a downstream side of the throttle valve, and an opening/closing type control valve arranged at the auxiliary intake path for controlling an idling intake amount, the idle rotational speed controller comprising:

an intake pressure detecting unit for detecting an intake pressure of the intake path;

a fuel supplying unit for controlling a supply amount of a fuel supplied to the combustion chamber based on at least the intake pressure; and

a controlling unit for synchronizing a drive reference position for driving to open or close the control valve with a timing of detecting the intake pressure by the intake pressure detecting unit.

2. The idle rotational speed controller of an internal combustion engine according to Claim 1, wherein the controlling unit controls a state of closing the control valve by setting

a timing of driving to close the control valve as the drive reference position.

3. The idle rotational speed controller of an internal combustion engine according to Claim 1, wherein the controlling unit increases the supply amount of the fuel when a pressure difference between the intake pressure before one cycle or more and a current one is equal to or larger than a threshold in accordance with a state of opening or closing the control valve.

4. The idle rotational speed controller of an internal combustion engine according to Claim 3, wherein the threshold is set by a two-dimensional table constituting an axis thereof by an engine rotational speed.

5. The idle rotational speed controller of an internal combustion engine according to Claim 3, wherein the controlling unit increases the supply amount of the fuel by asynchronous injection.

6. An idle rotational speed controller of an internal combustion engine including an intake path for sucking air to be supplied to a combustion chamber of the internal combustion engine, a throttle valve arranged at the intake path for controlling an intake amount, an auxiliary intake path for

communicating the intake path on an upstream side of the throttle valve and the intake path on a downstream side of the throttle valve, and an opening/closing type control valve arranged at the auxiliary intake path for controlling an idling intake amount, the idle rotational speed controller comprising:

an intake pressure detecting unit for detecting an intake pressure of the intake path;

a stroke determining unit for determining a stroke of the internal combustion engine based on at least the intake pressure; and

a controlling unit for synchronizing a drive reference position for driving to open or close the control valve with a timing of detecting the intake pressure by the intake pressure detecting unit.

7. The idle rotational speed controller of an internal combustion engine according to Claim 6, wherein the controlling unit controls a state of closing the control valve by setting a timing of driving to close the control valve as the drive reference position.

8. An idle rotational speed controller of an internal combustion engine including an intake path for sucking air to be supplied to a combustion chamber of the internal combustion engine, a throttle valve arranged at the intake path for

controlling an intake amount, an auxiliary intake path for communicating the intake path on an upstream side of the throttle valve and the intake path on a downstream side of the throttle valve, and an opening/closing type control valve arranged at the auxiliary intake path for controlling an idling intake amount, the idle rotational speed controller comprising:

an intake pressure detecting unit for detecting an intake pressure of the intake path;

a stroke determining unit for determining a stroke of the internal combustion engine based on at least the intake pressure; and

a controlling unit for controlling the control valve by synchronizing a drive reference position for driving to open or close the control valve with a timing of detecting the intake pressure by the intake pressure detecting unit, and changing the drive reference position with respect to a crank rotation of the internal combustion engine after finishing to determine the stroke by the stroke determining unit from that of before finishing to determine the stroke.

9. The idle rotational speed controller of an internal combustion engine according to Claim 8, wherein the controlling unit controls to bring about the drive reference position once for each rotation of a crank before finishing to determine the stroke by the stroke determining unit and bring about the drive

reference position once for each two rotations of the crank after finishing to determine the stroke.

10. An idle rotational speed controller of an internal combustion engine including an intake path for sucking air to be supplied to a combustion chamber of the internal combustion engine, a throttle valve arranged at the intake path for controlling an intake amount, an auxiliary intake path for communicating the intake path on an upstream side of the throttle valve and the intake path on a downstream side of the throttle valve, and an opening/closing type control valve arranged at the auxiliary intake path for controlling an idling intake amount, the idle rotational speed controller comprising:

an intake pressure detecting unit for detecting an intake pressure of the intake path;

a stroke determining unit for determining a stroke of the internal combustion engine based on at least the intake pressure; and

a controlling unit for controlling the control valve by synchronizing a drive reference position for driving to open or close the control valve with a timing of detecting the intake pressure by the intake pressure detecting unit, and preventing the control valve from being driven to open or close before finishing to determine the stroke by the stroke determining unit.

11. An idle rotational speed controller of an internal combustion engine including an intake path for sucking air to be supplied to a combustion chamber of the internal combustion engine, a throttle valve arranged at the intake path for controlling an intake amount, an auxiliary intake path for communicating the intake path on an upstream side of the throttle valve and the intake path on a downstream side of the throttle valve, and an opening/closing type control valve arranged at the auxiliary intake path for controlling an idling intake amount, the idle rotational speed controller comprising:

an intake pressure detecting unit for detecting an intake pressure of the intake path;

a fuel supplying unit for controlling a supply amount of a fuel supplied to the combustion chamber based on at least the intake pressure; and

a controlling unit for synchronizing a drive reference position for driving to open or close the control valve with a timing of detecting the intake pressure by the intake pressure detecting unit.

12. The idle rotational speed controller of an internal combustion engine according to Claim 11, wherein the controlling unit controls a state of closing the control valve by setting a timing of driving to close the control valve as the drive

reference position.

13. An internal combustion engine including the idle rotational speed controller of an internal combustion engine according to any one of Claims 1 to 12.

14. A controller of an internal combustion engine comprising an intake path for sucking air to be supplied to a combustion chamber of the internal combustion engine, a fuel supplying unit for supplying a fuel to the combustion chamber, a throttle valve arranged at the intake path for controlling an intake amount, and intake pressure detecting unit for detecting an intake pressure of the intake path;

wherein the fuel supplying unit increases a supply amount of the fuel when a pressure difference of the intake pressure before one cycle or more and a current one is equal to or larger than a threshold in accordance with an engine rotational speed of the internal combustion engine.

15. The internal combustion engine control apparatus according to Claim 14, wherein the threshold is set by a two-dimensional table constituting an axis thereof by an engine rotational speed.

16. The internal combustion engine control apparatus

according to Claim 14, wherein the controlling unit increases the supply amount of the fuel by asynchronous injection.

17. An internal combustion engine including the controller of an internal combustion engine according to any one of Claims 14 to 16.